

## REMARKS

The present application was filed on October 12, 2001, with claims 1-27. The Examiner has withdrawn claims 11-24 and 27 from consideration. Consequently, claims 1-10, 25 and 26 are pending. With this response, Applicant proposes to amend claims 4 and 5. In the outstanding Office Action, the Examiner required restriction of claims, rejected claims 4-6 under 35 USC §112, rejected claims 1 and 25 under 35 USC §102(e), and rejected claims 2-10 and 26 under 35 USC §103(a).

Restriction Requirement

In the outstanding Office Action, the Examiner required restriction of the application to one of the following two groups of claims: Group I, including claims 1-10, 25, and 26; Group II, including claims 11-24; and Group III, including claim 27. The Examiner has withdrawn claims 11-24 and 27, corresponding to Groups II and III respectively, from consideration.

However, Applicant respectfully asserts that the restriction requirement is improper and should be withdrawn, since each Group is generally related to techniques for saving power during decoding, and it is believed that a complete search for each Group would require a search of three subclasses in a single class. Accordingly, Applicant submits that an examination of Groups I-III would not impose a serious burden on the Examiner. Where, as here, "the search and examination of an entire application can be made without serious burden, the Examiner must examine it on the merits, even though it includes claims to independent or distinct inventions." MPEP §803.

Accordingly, it is respectfully requested that the restriction requirement be reconsidered and withdrawn and that all of the pending claims in the application be examined together in this application. Alternatively, Applicant respectfully selects Group I, claims 1-10, 25 and 26, for prosecution on the merits.

Objections to Drawings

The Examiner objected to the drawings because of the following: (1) the reference "1375" in the description was not in the drawings; (2) the references "999" in

FIG. 9, “1052” in FIG. 10(b), and “1400” in FIG. 14 in the drawings were not used in the description.

Regarding (1), the as-filed drawings contained the reference “1375” in FIG. 3(b), but the subsequently submitted formal drawings did not. With this response, Applicant submits substitute formal drawings containing the reference 1375.

Regarding (2), the reference “999” in the subsequently filed formal drawings was “994” in the originally filed drawings. With this response, Applicant submits a substitute formal drawing, containing FIG. 9, that changes “999” to --994-- in accordance with the originally filed drawings. The reference 994 is used, for instance, at page 13, line 27 of the disclosure. Additionally, the substitute formal drawing for FIG. 9 also has a change that attaches line 994 to a line leaving box 910 and entering box 960, in accordance with the originally filed drawings. Concerning the reference “1052,” Applicant has amended the specification to state that “the information symbols 1052 of  $u_{235}$ ,  $u_{234}$ , and  $u_{233}$  are received” (emphasis added). This amendment finds support at, for instance, FIG. 10(b) and page 19 of the specification. Concerning the reference “1400,” Applicant has removed this reference from FIG. 14, and Applicant submits a substitute formal drawing that does not have the reference “1400.”

In light of the foregoing, Applicant respectfully requests that the objections to the drawings be withdrawn.

#### Rejection of Claims 4-6 under 35 USC §112

The Examiner rejected claims 4-6 under 35 USC §112.

With regard to claim 4, the Examiner rejected claim 4 under 35 USC §112, second paragraph, as being indefinite because the intermediate polynomials were undefined. The Examiner also rejected claim 4 under 35 USC §112, first paragraph, as being incomplete for omitting essential structural cooperative relationships of elements, as the relationships between the intermediate polynomials are undefined.

Applicant respectfully traverses. It is believed that claim 4 as originally filed is fully compliant with 35 USC §112. Nonetheless, solely in order to expedite prosecution, Applicant has amended claim 4 to read the following (emphasis added): “The method of claim 3, wherein one intermediate polynomial is a first error evaluator

polynomial  $R(x)$ , wherein one intermediate polynomial is a first error locator polynomial  $F(x)$ , wherein  $R^{(r+1)}(x) = F^{(r+1)}(x) \cdot S(x) \bmod x^{2^t}$ , wherein  $r$  is a number of iterations,  $S(x)$  is a syndrome polynomial, and  $t$  is a number of errors capable of being corrected, wherein one intermediate polynomial is a second error evaluator polynomial  $Q(x)$ , wherein one intermediate polynomial is a second error locator polynomial  $G(x)$ , wherein  $Q^{(r+1)}(x) = G^{(r+1)}(x) \cdot S(x) \bmod x^{2^t}$ , and wherein the step of determining if a degree of at least one of the intermediate polynomials is less than a predetermined degree further comprises the step of determining if a degree of either  $R(x)$  or  $Q(x)$  is less than a predetermined degree, wherein  $R(x)$  and  $F(x)$  are valid when a degree of  $R(x)$  is less than the predetermined degree, and wherein  $Q(x)$  and  $G(x)$  are valid when a degree of  $Q(x)$  is less than the predetermined degree."

The amendment is support by, *inter alia*, by pages 5, 7, 10 and 11 of Applicant's specification. Applicant submits that the amendment provides adequate definitions of and relationships between the intermediate polynomials  $R(x)$ ,  $F(x)$ ,  $Q(x)$ , and  $G(x)$  and requests the rejections under 35 USC §112 to claim 4 be withdrawn.

With regard to claims 5 and 6, the Examiner rejected claims 5 and 6 under 35 USC §112, first paragraph, as failing to comply with the enablement requirement. The Examiner asserted that nowhere in the specification does Applicant teach the limitation in claim 5 of "placing a predetermined state into each of the intermediate polynomials, the predetermined state selected to reduce switching of the calculation circuit." The Examiner additionally rejected claims 5 and 6 under 35 USC §112, second paragraph, because a polynomial is a mathematical expression and a state cannot be placed into a polynomial and because an omitted structural cooperative relationship is the relationship between a polynomial and a predetermined state.

Applicant respectfully disagrees. In FIG. 9, Applicant shows a modified Euclidean algorithm circuit 900. As can be seen in the modified Euclidean algorithm circuit 900, there are an  $R(x)$  register 910, an  $F(x)$  register 920, a  $Q(x)$  register 930, and a  $G(x)$  register 940. These registers are connected to outputs of multiplexers 961, 962, 963 and 964, respectively. The opcode 945 block has inputs of zeros and these zeros can be feed through the multiplexers 961, 962, 963, 964 and to a respective  $R(x)$  register 910,

$F(x)$  register 920,  $Q(x)$  register 930, or  $G(x)$  register 940. Applicant, at page 14, lines 12-16, states the following:

Opcode = 0 (opcode 945 is selected): This puts the entire block into low power mode by feeding zeros to all the intermediate variables. It is activated upon detection of completion of the key equation solving process, i.e., when either  $\deg(R(x)) < t$  or  $\deg(Q(x)) < t$  is satisfied. The  $\deg(R(x))$  991 and  $\deg(Q(x))$  992 registers are used to determine whether these conditions are met.

The cited text and FIG. 9 clearly describe how zeros may be placed into respective  $R(x)$  register 910,  $F(x)$  register 920,  $Q(x)$  register 930, or  $G(x)$  register 940. As is known in the art, a “zero” is typically a state corresponding to a voltage level.

Additionally, claim 5 states, “providing . . . a plurality of intermediate polynomial elements . . . , each intermediate polynomial element containing coefficients of one of the intermediate polynomials.” Applicant has also amended claim 5 to state “wherein the step of reducing power consumption . . . further comprises the step of placing a predetermined state into each of the intermediate polynomial elements” (emphasis added).

Therefore, the predetermined state is placed into each of the intermediate polynomial elements, each of which contains coefficients of one of the intermediate polynomials.

The Examiner also asserted that a polynomial is a mathematical expression and a state cannot be placed into a polynomial. The amendment to claim 5 clarifies that the predetermined state is placed into each of the intermediate polynomial elements, each of which contains coefficients of one of the intermediate polynomials. Thus, a predetermined state is placed into an intermediate polynomial element.

The Examiner additionally asserted that an omitted structural cooperative relationship is the relationship between a polynomial and a predetermined state. The amendment to claim 5 clarifies that the predetermined state is placed into each of the intermediate polynomial elements, each of which contains coefficients of one of the intermediate polynomials. Applicant submits that there is no omitted structural cooperative relationship.

In light of the foregoing, Applicant respectfully requests the rejections under 35 USC §112 to claims 5 and 6 be withdrawn.

Rejection of Claims 1 and 25 under 35 USC §102(e)

In the outstanding Office Action, the Examiner rejected claims 1 and 25 under 35 USC §102(e) as being anticipated by Yang et al., U.S. Patent No. 6,606,727 (hereinafter, “Yang”). In the outstanding Office Action, the Examiner cited MPEP §2131.01 for the proposition that “[t]o serve as anticipation when the reference is silent about the asserted inherent characteristic, such gap in the reference may be filled with recourse to extrinsic evidence. Such evidence must make it clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill.” For this quotation, Continental Can Co. USA Inc. v. Monsanto Co., 948 F.2d 1264, 1268, 20 USPQ2d 1746, 1749 (Fed. Cir. 1991) is cited. The Examiner then introduced Ott, U.S. Patent No. 6,182,264 (hereinafter, “Ott”) and Wasada, U.S. Patent No. 5,970,075 (hereinafter, “Wasada”) “as teaching references for that which is inherent in the Wang patent.” See outstanding Office Action at page 8, middle of the sole paragraph on that page.

Applicant respectfully submits that none of the extrinsic evidence in Continental Can dealt with other patents used to prove that a disputed claim limitation was “inherent” in a single item of prior art. Instead, the extrinsic evidence comprised written evidence and testimony about a single piece of prior art being used in a §102(a) anticipation argument. See Continental Can, 20 USPQ2d at 1748-50. Moreover, Continental Can states the following:

Anticipation under §102(a) requires that the identical invention that is claimed was previously known to others and thus is not new. [Citations omitted.] When more than one reference is required to establish unpatentability of the claimed invention[,] anticipation under §102 can not be found, and validity is determined in terms of §103.

Continental Can, 20 USPQ2d at 1748. The Examiner is using more than one reference, and therefore validity must be determined in terms of §103. Applicant will assume that the rejection is a §103 rejection.

Independent claims 1 and 25 have limitations of “determining if an actual number of errors is less than a maximum error correction capability,” and “reducing power consumption in a decoder of the error correction system when the actual number of errors is less than the maximum error correction capability.”

Applicant respectfully submits that there is no disclosure or implication of these limitations in Yang. The Examiner uses Yang to assert a proposition that “processing in Figure 5 of Yang is stopped if it is determined that an actual number of errors is less than a maximum error correction capability.” See outstanding Office Action at page 9, second paragraph. The Examiner then states that, as per Ott, “a step for early termination of error correction processing when it is determine that no uncorrectable error exist[s] . . . is a step for reducing power consumption in a decoder.” Id.

Even if Yang can be considered to disclose (which Applicant submits Yang does not disclose) that an actual number of errors is less than a maximum error correction capability, Applicant respectfully submits that Yang never discloses or implies that termination of decoding reduces power in a decoder, as asserted by the Examiner. Concerning the cited step 67 of FIG. 5 of Yang, Yang states that “[i]f there are no identified uncorrectable interleaved code words 23, then the decoding is complete.” See col. 8, lines 45-6. However, there is no disclosure in Yang that power consumption in a decoder is reduced when an actual number of errors is less than a maximum error correction capability, as claimed in independent claims 1 and 25.

In particular, the fact that decoding is complete in Yang does not mean that power consumption is necessarily reduced in Yang. For instance, Yang could immediately begin processing more information symbols. Applicant reads Yang as not disclosing what happens when decoding is complete.

The Examiner cited Ott for the proposition that unnecessary error correction wastes processor capacity and increases power consumption. See outstanding Office Action at page 8, middle of paragraph. However, Ott states the following at col. 2, lines 3-13 (portions of which are cited by the Examiner):

The unnecessary transmission of redundant information harms system efficiency. The wasted transmission of error correction codes is very undesirable where the bandwidth of the communications channel is very limited, as in digital wireless communication systems in

high population density areas (e.g., cities). In addition to wasting bandwidth, unnecessary error correction wastes processor capacity in the receiving and transmitting devices. Signal processing effort is wasted encoding and decoding the error correction information, which in turn, needlessly slows the performance of the system and increases power consumption.

Applicant reads the cited text as indicating that there is increased power consumption if error correction codes are transmitted when it is unnecessary to transmit the error correction codes. Ott does not disclose reducing power consumption in a decoder of an error correction system when an actual number of errors is less than a maximum error correction capability, as claimed in independent claims 1 and 25.

The Examiner cited Wasada for the assertion that if the degree of the error locator polynomial is greater than the maximum number of correctable errors for a Reed-Solomon block of code, then the block is uncorrectable. See outstanding Office Action at page 8, bottom of paragraph.

Regardless of whether or not Wasada discloses the asserted teaching, Applicant respectfully submits that Wasada does not teach or imply reducing power consumption in a decoder of an error correction system when an actual number of errors is less than the maximum error correction capability, as in claims 1 and 25.

Because none of Yang, Ott, or Wasada, alone or in combination, teaches or implies reducing power consumption in a decoder of an error correction system when an actual number of errors is less than the maximum error correction capability, as in claims 1 and 25, Applicant respectfully submits that independent claims 1 and 25 are patentable over Yang, Ott, or Wasada, alone or in combination. Applicant respectfully requests withdrawal of the §102(e) rejection of claims 1 and 25.

#### Rejection of Claims 2-10 and 26 Under 35 USC §103(a)

Because independent claim 1 is patentable over the cited art, alone or in combination, claims 2-10, which include all limitations of independent claim 1 from which these claim depend, are also patentable.

As for independent claim 26, the Examiner rejects claim 26 under 35 USC §103(a) as being unpatentable over Yang. Independent claim 26 has the same limitations of “determining if an actual number of errors is less than a maximum error correction

capability,” and “reducing power consumption in a decoder of an error correction system when the actual number of errors is less than the maximum error correction capability” as in independent claims 1 and 25. Consequently, based on the arguments given above, Applicant respectfully submits that claim 26 is patentable over Yang, Ott and Wasada, alone or in combination.

Conclusion

Applicant respectfully submits that claims 1-10, 25 and 26 are patentable over the cited art, alone or in combination. The Examiner’s attention to this matter is appreciated.

Respectfully submitted,



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